Claims

1. Nanoparticles containing noble metals only or noble metals in combination with base metals, said nanoparticles being embedded in an aqueous solution of a temporary stabilizer which is a polysaccharide.

2. Nanoparticles according to claim 1, wherein temporary stabilizer can be removed by pyrolysis at temperatures up to 250°C.

3. Nanoparticles according to claim 1, wherein the temporary stabilizer can be removed by breaking glycosidic bonds of said polysaccharide in the presence of acids or alkalis.

4. Nanoparticles according to claim 1, wherein the aqueous solution has a pH-value in the range of from 5 to 8.

5. Nanoparticles according to claim 1, wherein the aqueous solution has a total chlorine concentration of less than 100 ppm.

6. Nanoparticles according to claim 1 containing at least one noble metal selected from the group consisting of platinum, palladium, rhodium, iridium, ruthenium, osmium, gold and silver and optionally at least one base metal selected from the group consisting of iron, cobalt, nickel, copper, titanium, vanadium, chromium, manganese, molybdenum, tungsten and rhenium.

7. Nanoparticles according to claim 6, having a particle size from 0.1 nm to 100 nm.

8. Nanoparticles according to claim 7, wherein the polysaccharide is gum arabic, xanthan gum, tragacanth or mixtures thereof.

9. Nanoparticles according to claim 8, wherein the concentration of particles in the aqueous solution is from 0.01 to 500 grams per liter.

10. Nanoparticles according to claim 9, wherein the ratio by weight of nanoparticles to stabilizer is from 10:1 to 1:10.

11. A process for preparing nanoparticles according to claim 1, comprising reducing precursor compounds for the desired noble metal and optionally the base metal with a total chlorine concentration of less than 500 ppm, using a reducing agent, in an aqueous solution in the presence of the polysaccharide.

12. A process for preparing nanoparticles according to claim 11, wherein said reducing agent is selected from the group consisting of hydrogen, hydrazine, formic acid, formaldehyde, lower aliphatic alcohols and compounds which decompose to give gaseous constituents during the reduction reaction.

13. A catalyzed inomer membrane made with the nanoparticles according to claim 1.

14. A gas diffusion electrode made with the nanoparticles according to claim 1.

15. A membrane electrode assembly made with the nanoparticles according to claim 1.

16. A supported electrocatalyst on a conductive carbon support having been made using the nanoparticles according to claim 1, and having a noble metal content of 10 to 80% by weight with respect to the total weight of the suggested electrocatalyst.

17. A catalyst ink for catalysing ionomer membranes, gas distribution structures and membrane electrode assemblies for fuel cells comprising the nanoparticles according to claim 1 in a carrier therefor.

18. A process for the catalytic coating of an ionomer membrane comprising applying the noble metal nanoparticles according to claim 1, to said membrane, after application of the noble metal nanoparticles, removing the polysaccharide by breaking the glycosidic bonds in the presence of an acid or alkali.

19. A process for the catalytic coating of a gas diffusion electrode comprising applying the noble metal nanoparticles according to claim 1 to said electrode, after application of the noble metal nanoparticles, removing the polysaccharide by pyrolysis at temperatures up to 250°C.

20. A process for the preparation of a carbon-supported electrocatalyst comprising depositing the noble metal nanoparticles according to claim 1, onto said carbon, after deposition of the noble metal nanoparticles, removing polysaccharide by breaking the glycosidic bonds in the presence of an acid or alkali.

21. A process for the preparation of a carbon-supported electrocatalyst comprising depositing the noble metal nanoparticles according to claim 1, onto said carbon after deposition of the noble metal nanoparticles, removing the polysaccharide by pyrolysis at temperatures up to 250°C.

22. A membrane electrode assembly for a fuel cell, containing nanoparticles obtained by using nanoparticles in accordance with claim 1 and having a total platinum loading of less than 0.5 mg Pt/cm^2.

23. A fuel cell stack, comprising a plurality of the membrane electrode assembly according to claim 22.